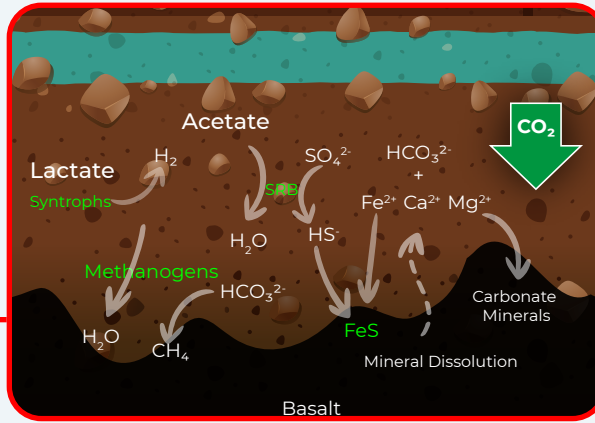
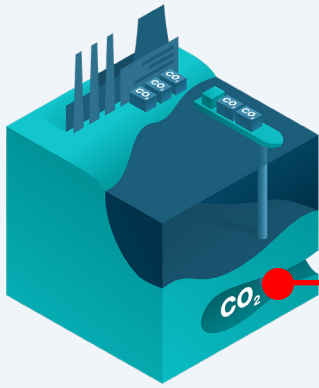


# INTERDECIPLINARY SCIENCE-BASED AND DATA-DRIVEN DIAGNOSTIC MODELS FOR CARBON CAPTURE, UTILIZATION, AND STORAGE (CCUS) APPLICATIONS

## CCUS-BATCH™

is an application programming interface (API) which provides access to the most comprehensive spectrum of complex abiotic and biotic reactions which are critical to design, optimize and predict efficacy of CCUS strategies.



- ➔ Geological sequestration in saline aquifer formations, depleted oil and gas reservoirs, enhanced oil recovery (EOR), deep unmineable coal beds.
- ➔ Enhanced weathering.
- ➔ Biological CO2 utilization and microbial EOR through synthetic biology.

## Sample Conceptual Model of CO<sub>2</sub> Injection in Basalt

### Syntrophic Oxidation



### Iron Reduction



### Iron Reduction



### Sulfate Reduction



### Sulfate Reduction



### Hydrogenotrophic Methanogenesis



### Acetoclastic Methanogenesis



Kinetically-Controlled Biogeochemical Reaction Rate

$$R = R_{max} F_D F_A F_T$$

$$F_D = \frac{\prod_D [D]^{\beta_D}}{\prod_D [D]^{\beta_D} + K_D \prod_D^+ [D^+]^{\beta_{D^+}}}$$

$$F_A = \frac{\prod_A [A]^{\beta_A}}{\prod_A [A]^{\beta_A} + K_A \prod_A^- [A^-]^{\beta_{A^-}}}$$

$$F_T = 1 - \exp\left(\frac{-nF\Delta E^0 + mF\Delta\psi}{\chi RT}\right) \times \left(\frac{[\text{H}_{out}^+]^m \prod_D^+ [D^+]^{R_D} \prod_A^- [A^-]^{R_A}}{[\text{H}_{in}^+]^m \prod_D [D]^{R_D} \prod_A [A]^{R_A}}\right)^{1/\chi}$$

## Choose the Best Plan For You!

	PRO	PRO PLUS	ENTERPRISE	What is Offered Under Each Plan?
Customized biogeochemical library	▣	▣	▣	Offers library of biogeochemical reactions along with their associated kinetic rate laws and equilibrium thermodynamic databases under various temperature, pressure and salinity conditions.
Containerized application programming interface		▣	▣	Runs in any operator system in a containerized environment.
Coupling know-how with user's in-house simulators			▣	Can be integrated into existing reservoir simulators such as <b>Petrel, Eclipse, CMG-GEM, GEOSX</b> , or any other fluid flow and transport code through its API.

Partnerships:

**\$1.4 million** from 3 prestigious small business innovation research grants



National Science Foundation  
WHERE DISCOVERIES BEGIN



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